

# IDAHO DEPARTMENT OF FISH & GAME

## QUARTERLY COORDINATION REPORT

Dingell-Johnson Projects



1 December 1976-28 February 1977

by

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## TABLE OF CONTENTS

	<u>Page</u>
 F-18-R-23 -- STATEWIDE FISHING HARVEST SURVEY	
Job 1. Estimates of the 1976 Harvest of Salmon and Steelhead.....	1
Job 3. Check Station Surveillance of Major Salmon and Steelhead Fisheries in Idaho.....	1
 F-49-R-15 -- SALMON AND STEELHEAD INVESTIGATIONS	
Job 1-a. Salmon Spawning Ground Surveys.....	1
Job 3-a. Evaluation of Pond Rearing Fish Culture Methods .....	2
Job 3-b. Evaluation of Survival of Pond Reared Chinook Salmon .....	2
 F-53-R-12 -- LAKE AND RESERVOIR INVESTIGATIONS	
Job 3-c. Evaluation of Fish Populations in Anderson Ranch Reservoir .....	2
Job 3-d. Experimental Introduction of Smallmouth Bass into Anderson Ranch Reservoir .....	2
Job 4-a. Lake Pend Oreille Creel Census .....	3
Job 4-c. Kokanee Spawning Trends.....	4
Job 4-d. Lake Pend Oreille Limnological Studies.....	4
Job 4-e. Lake Pend Oreille Kokanee Life History Studies.....	5
Job 4-f. Lake Pend Oreille Kamloops Life History Studies.....	5
Job 4-g. Separation of Kamloops Stocks in Pend Oreille Lake by Electrophoresis .....	6
Job 14-a. Separation of Henrys Lake Cutthroat and Hybrid Trout by Morphological Characteristics and by Electrophoresis .....	6
Job 14-d. Angler Opinions, Attitudes and Preferences at Henrys Lake .....	7
Job 25-a. Little Camas Reservoir Fisheries Investigation .....	8

## TABLE OF CONTENTS (Continued)

	<u>Page</u>
Job 27-a. Salmon Falls Creek Reservoir Fisheries Investigations .....	9
 F-59-R-8 -- CATCH AND RELEASE STUDIES	
Job 1. Evaluation of Angling Regulations in Management of Cutthroat Trout .....	9
 F-66-R-2 -- RIVER AND STREAM INVESTIGATIONS	
Job 2. Selway River Fisheries Investigations .....	10
Job 3-b. Silver Creek Fisheries Investigations-Fish Distribution and Abundance Survey.....	11
Job 3-d. Silver Creek Fisheries Investigations-Food Availability and Utilization by Trout .....	11
Job 4. Lochsa River Fisheries Investigations .....	11
Job 5. South Fork Boise River Fisheries Investigations.....	12
Job 6. Wolf Lodge Creek Cutthroat Trout Studies .....	13
Job 7. Henrys Fork Fisheries Investigations.....	13
F-67-C-2 --FISHERY RESEARCH SUPERVISION .....	14
 F-68-R-1 -- TEST REARING OF SPRING CHINOOK SALMON	
Job 1. Evaluation of Release Time of Pond Reared Chinook Salmon .....	14
 F-69-R-2 -- STREAM FLOW INVESTIGATION	
Job 1. Evaluation of Applicability of Water Surface Profile Predictive Modeling in Reference to Stream Resource Maintenance Flow Determinations .....	14
Job 2 Stream Resource Maintenance Flow Determination on Idaho Streams .....	14
 F-77-R-1 -- REGIONAL FISHERY MANAGEMENT INVESTIGATIONS	
Job 1-a. Region I Mountain Lakes Investigations.....	15
Job 1-b. Region I Lowland Lakes Investigations .....	15

## TABLE OF CONTENTS (Continued)

	<u>Page</u>
Job 1-c. Region I Stream Investigations.....	16
Job 1-d. Region I Technical Guidance .....	16
Job II-a. Region 2 Mountain Lake Investigations .....	16
Job II-b. Region 2 Lowland Lake Investigations.....	17
Job II-c. Region 2 Stream Investigations.....	17
Job II-d. Region 2 Technical Guidance .....	17
Job II-e. Region 2 Salmon and Steelhead Investigations .....	18
Job III-a. Region 3 Mountain Lakes Investigations.....	18
Job III-b. Region 3 Lowland Lakes and Reservoirs Investigations.....	18
Job III-c. Region 3 Stream Investigations.....	18
Job III-d. Region 3 Technical Guidance .....	19
Job III-e. Region 3 Salmon and Steelhead Investigations .....	19
Job IV-a. Region 4 Mountain Lakes Investigations.....	19
Job IV-b. Region 4 Lowland Lake Investigations.....	19
Job IV-c. Region 4 Stream Investigations .....	20
Job IV-d. Region 4 Technical Guidance .....	20
Job V-a. Region 5 Mountain Lakes Investigations.....	21
Job V-b. Region 5 Lowland Lakes Investigations .....	21
Job V-c. Region 5 Stream Investigations .....	21
Job V-d. Region 5 Technical Guidance .....	21
Job VI-a. Region 6 Mountain Lakes Investigations.....	22
Job VI-b. Region 6 Lowland Lakes Investigations .....	22
Job VI-c. Region 6 Stream Investigations .....	22

## TABLE OF CONTENTS (Continued)

	<u>Page</u>
Job VI-d. Region 6 Technical Guidance .....	23
Job VI-e. Region 6 Salmon and Steelhead Investigations .....	23

## QUARTERLY COORDINATION REPORT

(1 December 1976 - 28 February 1977)

### IDAHO DEPARTMENT OF FISH AND GAME

This quarterly report is intended to satisfy the requirements under project F-67-C-2. The material that has been included was abstracted from the research biologists' annual performance reports and briefly summarizes the work undertaken and results from each of these projects during the quarter.

#### F-18-R-23 - - STATEWIDE FISHING HARVEST SURVEY

##### Job 1. Estimates of the 1976 Harvest of Salmon and Steelhead

No fishing for salmon was permitted in Idaho in 1976 because of an insufficient run.

Also because of a small run, steelhead fishing was not permitted in the spring of 1976. A slight improvement of the steelhead run into Idaho in the fall of 1976 led to catch-and-release regulations on the Clearwater River system, and a minor consumptive fishery on the Snake and Salmon Rivers. An estimated 2,247 steelhead were taken in the consumptive fishery, and 1,996 steelhead were handled in the catch-and-release fishery.

##### Job 3. Check Station Surveillance of Major Salmon and Steelhead Fisheries in Idaho

There were no steelhead sport fishery on the Salmon River during the spring of 1976. On 1 October 1976, the river was reopened to the taking of steelhead trout. The season bag limit (1 October - 31 December 1976) was three fish, with a daily bag and possession of one. Anglers were allowed to continue fishing for steelhead after the one fish daily limit had been reached with the stipulation that they release any more steelhead caught back to the river.

Each Saturday and Sunday from 1 October through 28 November, we operated an angler check station on the Salmon River road near North Fork, Idaho. We set up the station at noon and operated until dark each day. We queried anglers on the hours they fished, fish caught, area fished, and inspected their catch whenever possible to define the percent of hatchery-origin steelhead.

Anglers caught steelhead at the rate of 35 hours per fish. Approximately 74% of the steelhead caught were kept and the other 26% returned to the water. About 47% of the steelhead caught were of hatchery origin as distinguished by identifiable deformity of the dorsal fin.

#### F-49-R-15 - - SALMON AND STEELHEAD INVESTIGATIONS

##### Job 1-a. Salmon Spawning Ground Surveys

Each year regional fishery biologists survey major chinook salmon spawning areas in their respective regions to count the number of redds constructed in trend count areas and to obtain age and sex composition data. The data are made available for trend analysis, management, and research use.

Spring chinook redd counts in 1976 were 61% below the 5-year average while summer chinook counts were 55% below the 5-year average.

Job 3-a. Evaluation of Pond Rearing Fish Culture Methods

and

Job 3-b. Evaluation of Survival of Pond Reared Chinook Salmon

The basic concept of pond rearing chinook salmon on a dry feed diet for release as smolts in the fall is a viable technique for remote areas such as the upper Salmon River.

Because it is dependent on an off-site hatchery system for egg acquisition, hatching and fry starting, it may be viewed as an extension of that system. In that sense, this type of program can markedly increase the range of effectiveness and numbers of smolts produced by a central hatchery facility.

It now appears that successful operation of the Decker Pond rearing program hinges on whether or not an annual outbreak of eye fluke (Diplostomum sp.) can be controlled.

F-53-R-12 - - LAKE AND RESERVOIR INVESTIGATIONS

Job 3-c. Evaluation of Fish Populations in Anderson Ranch Reservoir

and

Job 3-d. Experimental Introduction of Smallmouth Bass into Anderson Ranch Reservoir

Creel census from 29 May to 20 August showed anglers expended an estimated 36,369 fishing hours to harvest an estimated 19,493 kokanee, 1,848 rainbow trout, 94 Dolly Varden, 1,344 yellow perch, 723 smallmouth bass and 894 squawfish. Boat anglers accounted for 78% of the total estimated effort and all of the kokanee harvest.

Idaho resident anglers made up 95.3% of anglers checked at Anderson Ranch in 1976 and nonresidents made up 4.7% of the total.

Kokanee dominated species composition data from angler harvest (80% of harvest), vertical gill net catch (85% of catch) and horizontal gill net catch (47% of catch). Kokanee spawners in 1976 averaged 289 mm (11.4 in) total length (females and 294 mm (11.6 in) total length (males). Kokanee in the angler harvest averaged 249 mm (9.8 in). Two age classes of kokanee (2 and 3)

were evident in both the angler harvest and gill net catches.

Plankton sampling in 1976 indicated Daphnia, Bosmina, Cyclops and Diaptomus as most common macrozooplankters in Anderson Ranch. Plankton density peaked in mid-summer at all three sampling stations, coinciding with maximum surface water temperatures and rapidly increasing water transparency. Surface water temperatures at Anderson Ranch peaked at 21-24 C (70-75 F) in mid-summer, however, temperatures at 20 m (65.5 ft) depth rose gradually from April to 30 September when the last samples were taken at 15.5 C (60 F).

Anglers harvested 723 smallmouth bass during the 1976 census period, 29 May to 20 August. Harvested smallmouth ranged in total length from 110-480 mm (4.5-19 in) with a mean total length of 237 mm (9.3 in).

Smallmouth nesting began 10 June at water temperatures of 16 C (60 F). Underwater observations in mid-July revealed concentrations of fry in most bays from Lime Creek to Anderson Ranch Dam, but observations were again hampered by turbid water in some areas.

The gill net catch in 1976 gave no indications of length distribution changes in the squawfish population, but angler catch rates of squawfish continued to decline as they have since the first smallmouth bass introductions in 1972.

#### Job 4-a. Lake Pend Oreille Creel Census

In 1976, sport anglers fished an estimated 241,736 hours during 53,705 man-days to catch 227,491 fish between 13 January and 30 November at Lake Pend Oreille. Kokanee and trout comprised 96% and 3% of the estimated catch, respectively.

Anglers seeking kokanee fished an estimated 150,911 hours during 37,856 man-days to catch 217,914 kokanee averaging 1.4 fish per hour. Information shows the annual harvest of kokanee (218,639) in 1976 was the lowest on record since the census commenced in 1951. The annual catch rate for kokanee was also the lowest.

Age composition of the catch showed that in 1976, 4-year old kokanee predominated the adult catch between 15 July and 15 October. Sub-adult 3-year olds contributed significantly to the catch, providing 56% of the August harvest. In contrast, the contribution of adult 5-year old kokanee has declined significantly the past 2 years and may be perennially diminished.

Anglers seeking trophy Kamloops trout over 432 mm (17 in), fished an estimated 79,802 hours during 15,195 man-days to catch 1,403 trophy Kamloops and averaged 56.9 hours per trophy fish. In addition, anglers seeking other salmonid species caught 240 trophy Kamloops. The trophy Kamloops harvest (1,643) in 1976 surpassed the previous high in 1963 (1,442).

Hatchery personnel did not release any Kamloops trout fingerlings into the Lake Pend Oreille system in 1976. Since 1968, an estimated 446 of



502,835 clipped fish have been caught. Census personnel have found only three clipped returnees of 1,403 trophy Kamloops observed during the last 6 years.

#### Job 4-c. Kokanee Spawning Trends

Spawning escapement from both early and late-run kokanee was assessed in Lake Pend Oreille and its tributaries during the 1976-77 spawning season.

Early-run kokanee began spawning in Trestle Creek 5 September 1976 and continued through 25 September when most spawning activity terminated. Trestle Creek supported more kokanee in 1976 than either 1973 or 1974 but considerably less than 1975 which peaked at nearly 15,000. The 1976 run peaked 13 September with a count of 1,486 kokanee.

Fewer late spawning kokanee were observed spawning in the tributaries and on the shorelines of Lake Pend Oreille during the 1976-77 spawning season than were seen during the years 1972 through 1976. Granite Creek supported most of the tributary spawning while Bayview received most of the shoreline spawners. A total of 10,151 kokanee were counted through the Sullivan Springs Creek weir.

Overall, by comparing maximum single counts of late-run kokanee taken during the spawning years 1972 through 1976, the 1972 and 1976 spawning runs were similar, both being about one-third of the kokanee numbers counted from 1973 through 1975.

The low escapement trend and very poor kokanee catch in 1976 in Lake Pend Oreille depicted the low abundance of the 1972 year class.

#### Job 4-d. Lake Pend Oreille Limnological Studies

Data collected during 1976 show no discernible change in water quality or trophic status of the lake. Indices of primary production suggest that the lake is a productive oligotrophic system.

The reduction in abundance of Daphnia and delay in temporal distribution of Daphnia and Bosmina observed in 1975 relative to 1974 and previous seasons, was again evident in 1976. The changes in the macrozooplankton community appear to be primarily a response to establishment of a Mysis relicta population, though low heat income in 1975 and 1976 may also have had some influence.

The change in Daphnia abundance may represent a reduction in food available to kokanee. If so, food abundance was very low during 1975 with some improvement in 1976. The change in temporal availability of Daphnia and Bosmina could be critical to survival of emerging fry. Temporal distribution of these food items should be an important consideration in future fry releases.

Kokanee food ration data may provide a simplified expression of kokanee

density for comparison with other populations. Preliminary cropping data suggests that kokanee density was not high enough to significantly affect the food supply.

#### Job 4-e. Lake Pend Oreille Kokanee Life History Studies

During 1976 we made monthly echosounding estimates on Lake Pend Oreille to assess fish abundance and movement. We used midwater trawling to sample kokanee for age, growth and food habit data. During January, 1977 the trawl was used to make an estimate of year class strength in the lake. We used a small trawl to evaluate the densities and distribution of Mysis relicta in the lake.

Peak fish abundance in Pend Oreille continued to decline in 1976. Estimates of 12.1 million were recorded in 1974 with 9.2 million in 1975 and 7.6 million in 1976. The continual decline may be related to survival of young-of-the-year kokanee associated with a major change in the lake's food supply that has occurred since 1974. Kokanee growth to the first annulus declined in 1975.

Estimates of year class strength in January, 1977 yielded 3.0 million fish in the 1973 year class, 1.9 million in the 1974 year class and 2.3 million in the 1975 year class. Kokanee made up 99% of those fish collected in the trawl during January.

Average Mysis relicta densities in Lake Pend Oreille increased 5-fold from 1975 to 1976 (50.6 mysids/m<sup>3</sup>). It appears that Mysis populations have significantly altered zooplankton composition in the lake.

#### Job 4-f. Lake Pend Oreille Kamloops Life History Studies

During 1976 and 1977 we collected life history data on Kamloops trout in the Pend Oreille Lake drainage. We made trend counts of adult spawners in the major tributaries, snorkeled the tributary streams to evaluate abundance and movement of juvenile Kamloops and radio tagged adult fish to assess the presence of overwintering in the Clark Fork River.

Lightning Creek appeared to be the most significant spawning tributary to the lake; supporting about the same number of spawning adults as was found in the entire Pack River drainage. We estimated the total lake spawning escapement in 1977 to approximate 200 to 300 Kamloops.

Snorkeling data from the tributary streams showed an initial downstream movement of Kamloops fry from the upper spawning gravels to lower nursery areas. The presence of 1 to 2 year-old fish in the lower tributaries coupled with scale analysis data, indicated that a majority of the Kamloops juveniles reared in the tributaries before migrating to the lake.

Although the radio tagging data was not conclusive, it does indicate that fall-run Kamloops overwintered in the Clark Fork River in preparation for spawning the following spring.

#### Job 4-g. Separation of Kamloops Stocks in Pend Oreille Lake by Electrophoresis

A biochemical study was conducted from May 1976 to May 1977 to determine if differences in serum proteins were present between two wild populations of Kamloops rainbow trout, Salmo gairdneri, from Pend Oreille Lake, Idaho and the brood stock held at Clark Fork Fish Hatchery.

We could find no consistent differences in serum protein patterns between these populations of trout. Apparently these populations have not been isolated long enough for detectable differences to accumulate.

#### Job 14-a. Separation of Henrys Lake Cutthroat and Hybrid Trout by Morphological Characteristics and by Electrophoresis

A morphological and biochemical study on "pure" Henrys Lake cutthroat trout, Salmo clarki and hybrid trout (Henrys Lake cutthroat ♀ x rainbow trout ♂, Salmo gairdneri) was undertaken from April 1976 to May 1977. Samples were taken from fish entering the 1976 spawning run to the hatchery at Henrys Lake.

Morphological analysis revealed that only two of the 23 fish collected could be classified as hybrid trout. Most of the fish entering the spawning run were cutthroat trout with only slight evidence of rainbow trout characteristics.

We could find no consistent differences between these two hybrids and the other trout based upon electrophoretic analysis of blood serum proteins with standard two-dimensional polyacrylamide gel electrophoresis or when SDS (sodium docleylsulfate) was added during separation in the first dimension.

No external character was found that could be readily used by hatchery personnel to distinguish these two types of trout as they entered the 1976 spawning migration to Henrys Lake Fish Hatchery.

#### Job 14-b. Evaluation of Henrys Lake Management Program

The total estimated angler hours and fish harvested and released in Henrys Lake for 1976 is:

	Angler hours						Released		
		Cut	Marked Cut	F <sub>1</sub>	Brook	Total	Cut	Brook	Total
Bank	3,373	967	23	2	162	1,154	806	11	817
Tube	1,201	137	0	0	36	173	570	123	693
Boat	63,535	13,848	144	18	3,313	17,323	12,357	4,130	16,487
Total	68,109	14,952	167	20	3,511	18,650	13,733	4,264	17,997

For boat and tube anglers (which are comparable to 1975 data) the estimated 1976 effort was 75% of that in 1975 and the harvest of cutthroat and hybrid was 52% while that for brook was 105% of the 1975 figures (total 1976 harvest = 58% of 1975). Bank angler pressure is believed to have increased considerably this year, especially in October.

The average length of the cutthroat harvest during October was 450 mm which was the highest of the season. The average length of brook trout was the lowest of the year at 357 mm. This was because most of the mature spawning fish were no longer available to the fishery during October. Several brook trout were observed guarding redds within the Staley Springs glory hole which may mean that all reproduction in the lake is not dependent on the tributary streams.

The average total length of the females used to produce cutthroat for Henrys Lake this year was 449 mm (17.7 in). The males fertilizing these eggs averaged 477 mm (18.8 in). Cutthroat females used for the hybrid crosses averaged 460 mm for the steelhead sperm and 462 mm for the Henrys Fork rainbow (18.1 and 18.2 in), respectively). The average total length of all females in the 1976 spawning run from 15 March to the end of the run was 443 mm (17.4 in). Males over the same period averaged 429 mm (16.9 in) and the average total length for the entire spawning run from 15 March was 435 mm (17.1 in).

#### Job 14-d. Angler Opinions, Attitudes and Preferences at Henrys Lake

Angler response to selected questions is as follows::

1. 793 respondents:  
13.9% rated fishing as "excellent"  
27.4% rated fishing as "good"  
23.6% rated fishing as "fair"  
24.3% rated fishing as "poor"  
10.8% were undecided.
2. 616 respondents:  
The brook trout was the preferred species at Henrys Lake with 198 first choice responses compared to 164 for hybrids and 98 for cutthroat. 175 anglers had no preference. (There can be more first choices than respondents with preference as 2 of the 3 fish could be rated equally.)
3. 830 respondents:  
70% of the anglers desired is to manage for larger fish even if it meant reduced limits.
4. 632 respondents:  
65% of the anglers were satisfied with this year's regulations.

## Job 25-a. Little Camas Reservoir Fisheries Investigations

Differential marking of fingerling and catchable rainbow stocked in Little Camas Reservoir was again used to evaluate harvest, survival and growth of hatchery fish. We followed 1975 and 1976 released hatchery rainbow by monitoring angler use and catch. We also recorded angler license class composition and angler opinions.

From 1 May through 30 November 1976 we estimated total angling effort at 55,362 hours and total harvest at 15,291 rainbow trout. Bank anglers accounted for 70% of the effort and 54% of the rainbow catch. The first census interval (1-29 May) accounted for 21,140 hours estimated effort, the heaviest use recorded during 1975 or 1976. The average rainbow catch rate for 1976 was 0.28 fish per hour compared to 0.29 fish per hour recorded in 1975.

The harvest of catchable rainbow introduced in 1975 reached 50% of the number released or an additional 12% over the 1975 harvest. Catchables introduced in 1976 were harvested in greater numbers than any other group in 1976 (26% of release or 6,429 fish). Catchable releases from both years accounted for 49% of the 1976 rainbow harvest.

The harvest of fingerling rainbow stocked in 1975 reached 12% of the total number released or an additional harvest of 4.5% over the 1975 harvest. Fingerlings introduced in 1976 contributed only 1,160 fish or 0.8% of the number released to the 1976 harvest. Fingerlings released both years accounted for 30% of the 1976 rainbow harvest.

Those fingerlings from the 1975 release harvested in 1976 averaged over 295 mm (11.6 in) total length and 1975 released catchables averaged over 320 mm (12.6 in) total length in the 1976 harvest. The difference in mean total length in the harvest of 1975 planted fingerlings and catchables was 19 mm (0.7 in) by August 1976 indicating faster growth in rainbow planted as fingerlings.

Of three lots of catchables released in 1975 the earliest (8 May) entered the catch in the greatest numbers in 1975 and least numbers in 1976. The latest lot (26 June) entered the catch in the least numbers in 1975 and the greatest numbers in 1976. Creel returns from the earliest lot (8 May) showed the greatest mean total length increase over the census periods in 1975 and 1976.

Fish identified as wild rainbow trout again accounted for less than 10% of the harvest in 1976.

Hatchery rainbow introduced prior to 1975 accounted for 12% of the 1976 harvest. The mean total length of pre-1975 holdover fish in the 1976 harvest was 356 mm (14.0 in) giving this group the highest mean total length in the 1976 harvest.

Over 95% of the anglers contacted during creel census in 1976 were

residents of Idaho. Licenses costing anglers \$1.00 or less made-up 24% of those checked.

About 71% of the anglers interviewed during 1976 rated fishing as "good" or "fair", an increase of 12% over 1975 opinions which may be related to the increased numbers of hatchery fish released in 1976.

#### Job 27-a. Salmon Falls Creek Reservoir Fisheries Investigations

Early season gillnetting captured rainbow trout, kokanee, coho, perch and crappie. No walleye were found in this sample. Late season gill-netting operations were not conducted.

Angler tag return information from 1976 and our fishery study in 1975 indicated that the spring releases of rainbow trout in 1975 contributed fewer fish to the fishery than the summer and fall releases. Summer releases contribute most to the fishery during the same year while fall releases contribute most to the fishery during the following year.

### F-59-R-8 -- CATCH AND RELEASE STUDIES

#### Job 1. Evaluation of Angling Regulations in Management of Cutthroat Trout

I report here the effects of special angling regulations on native cutthroat trout (Salmo clarki Richardson) populations and fisheries in three northern Idaho streams. The Kelly Creek drainage was managed with catch-and-release regulations starting in 1970. Trophy-fish regulations (13-inch minimum size - 3 fish bag limit) were initiated on the upper St. Joe River drainage in 1971. The drainage of the North Fork of the Clearwater River upstream from Kelly Forks had standard regulations.

Catch-and-release and trophy-fish regulations improved the cutthroat trout population structures and fisheries in Kelly Creek and the upper St. Joe River. Standard regulations did not change the cutthroat population structure or fishery in the North Fork, even when the bag limit was reduced from 15 fish to 3 fish.

Annual mortality rates for age III and older cutthroat trout declined in Kelly Creek and the upper St. Joe River as a result of special angling regulations. In Kelly Creek, we estimated the annual mortality rate at 0.63 in 1969 and 0.82 in 1970, but less than 0.50 in 1974 and 1975. In the upper St. Joe River, we estimated the annual mortality rate at 0.62 in 1969 and 0.71 in 1970, prior to initiation of special regulations, compared to 0.47 in 1974 and 0.56 in 1975.

Cutthroat trout of all sizes increased in abundance in the streams with special regulations. We counted 13 times more cutthroat per snorkeling transect on Kelly Creek in 1975 than in 1970, and 3 to 5 times more cutthroat in the upper St. Joe River transects in 1975 than in 1970. The increased abundance of small (<150 mm) cutthroat in Kelly Creek and the St. Joe River was evidence of increased recruitment to the population and fisheries.

Increased numbers of large ( 250 mm) cutthroat was evidence that many small fish caught and released by anglers survived and became available to anglers at a larger size. Spawner-sized cutthroat increased 10 fold or more in the St. Joe River and Kelly Creek. On the North Fork, cutthroat trout abundance remained virtually unchanged since 1970.

The number of hours fished declined initially as a result of special regulations. Angler effort increased to pre-special regulation levels with trophy-fish angling regulations, but remained at about 20% of former levels with catch-and-release regulations. Angler catch rates on Kelly Creek increased from 0.4 cutthroat/hour in 1970 to 1.3 cutthroat/hour in 1975. On the St. Joe River, angler catch rates increased from 0.2 cutthroat/hour in 1968 to about 2.5 cutthroat/hour in 1975. On the North Fork, anglers caught 0.2 cutthroat/hour in 1970 and 1975. Anglers caught 5 times more cutthroat trout in the St. Joe River in 1975 than in 1968, but the angler harvest of cutthroat decreased. On Kelly Creek, angler catch of cutthroat remained about the same even with decreased angler effort, but harvest of cutthroat was eliminated.

Characteristics of anglers fishing Kelly Creek (angling method, age, sex, and state of residence) and the St. Joe River (angling method and state of residence) changed since special regulations were initiated. For the North Fork, only the proportion of resident anglers changed since 1969. In 1975, more than 90% of the anglers interviewed while fishing Kelly Creek and the St. Joe River favored the special regulations and most anglers thought that fishing was better in 1975 than before special regulations were initiated. On the North Fork, 68% of the anglers interviewed believed that quality of angling on the North Fork had declined since the late 1960s.

In Kelly Creek, cutthroat grew about 55 mm a year during their first two years in the river (4th and 5th years of life), and most male and female cutthroat matured at age VI. Cutthroat trout grew about 60 mm a year during their first three years in the upper St. Joe River (3rd, 4th, and 5th years of life), and most male and female cutthroat matured at ages IV and V, respectively.

Returns of fish tagged and released in the three study streams indicate that cutthroat trout migrated upstream into the upper drainages (study areas) in the spring and early summer, few cutthroat moved during the summer, and cutthroat migrated downstream to lower portions of the drainages in the fall. Downstream fall migrations of cutthroat trout probably increased their overwinter survival.

To document the full effect of the catch-and-release and trophy-fish angling regulations on cutthroat trout populations and fisheries, the special regulations should be continued until the cutthroat populations reach maximum abundance. Future management alternatives for the cutthroat trout fisheries in Kelly Creek and the upper St. Joe River and their trade-offs are discussed.

## F-66-R-2 -- RIVER AND STREAM INVESTIGATIONS

### Job 2. Selway River Fisheries Investigations

Between 2 and 13 August 1976, fisheries personnel snorkeled 27 transects

in the Selway River from White Cap Creek to Race Creek (unroaded). We counted totals of 186 cutthroat (6.9 per transect), 250 juvenile steelhead (9.3), 21 juvenile chinook (0.8), 324 whitefish (12.0) and 2 Dolly Varden (0.7). Comparatively we counted 4.4 cutthroat per transect in this section in 1973, 5.5 in 1974 and 5.8 in 1975. The cutthroat limit was reduced to three fish in this area in 1974 and 1975 and was catch-and-release for trout in 1976. Juvenile steelhead averaged 10.1 per transect in 1973, 7.5 in 1974 and 13.0 in 1975. Juvenile chinook averaged 5.8 in 1973, 1.6 in 1974 and 3.2 in 1975. Whitefish averages have been 28.2 in 1973, 29.5 in 1974 and 19.9 in 1975.

In the upper roaded section of the Selway (Deep Creek to White Cap Creek) cutthroat numbers have increased from 1.0 per transect in 1973 to 4.0 in 1976. This section is governed by the same catch-and-release regulations as the unroaded portion. We have seen very few cutthroat in the lower roaded section (Race Creek to mouth), with the 0.8 per transect in 1976 a 4-year high. This lower section is under general catch-and-keep regulations.

We measured a total of 238 cutthroat from the Selway River between White Cap Creek and Race Creek during 1976. They ranged from 128 to 398 mm (5.0 to 15.7 in) and averaged 258 mm (10.2 in). In 1975, 233 cutthroat measured from this area averaged 226 mm (8.9 in). The percent of cutthroat over 305 mm (12 in) increased from 12.0% in 1975 to 20.9% in 1976.

During 1975 and 1976, we tagged a total of 508 cutthroat in the Selway River and tributaries. To date we have received 23 tag returns for a return rate of 4.50. The longest migrations have been 26 km (16 mi) upstream and 22.5 km (14 mi) downstream. Ten of the 23 have shown no significant movement.

Job 3-b. Silver Creek Fisheries Investigations-Fish Distribution and Abundance Survey

and

Job 3-d. Silver Creek Fisheries Investigations-Food Availability and Utilization by Trout

The annual performance report for these two jobs has not yet been prepared and no additional information is available.

Job 4. Lochsa River Fisheries Investigation

From 29 May through 10 September 1976, fisheries personnel conducted an intensive angler count-interview type creel census on the Lochsa River and the lower 8 miles of Crooked Fork Creek. Census techniques and stream sections were structured such that comparisons could be made with previous Lochsa River census studies conducted in 1966 and 1956.

Anglers fished an estimated 13,679 hours on the Lochsa during the 1976 general trout season. They caught an estimated 11,170 (73.0%) wild rainbow-steelhead, 2,557 (16.7%) hatchery catchable rainbow, 654 (4.3%) cutthroat,



195 (1.3%) Dolly Varden and 717 (4.7%) whitefish. Approximately 60.3% of the total angler effort was expended above Boulder Creek, and this effort yielded 75.6% of the wild rainbow -steelhead and 68.7% of the cutthroat trout. The Lochsa River above Boulder Creek and the lower 12.8 km (8 mi) of Crooked Fork Creek will be catch-and-release for trout in 1977. By comparison, anglers fished an estimated 32,117 hours in the Lochsa River between 4 June and 10 September, 1966 and caught 35,256 (66.0%) wild rainbow-steelhead, 14,472 (27.5%) catchable rainbow, 1,657 (3.1%) cutthroat, 260 (0.5%) Dolly Varden and 1,787 (3.3%) whitefish (Keating 1966).

In addition to standard biological creel census information we noted angler residency and angling methods and collected angler preference information. Of the 809 anglers interviewed on the Lochsa River during 1976, 77.8% were residents of Idaho. In 1966, 74% of the anglers interviewed were residents. Our 1976 interviews revealed that 46.0% of the anglers fishing the Lochsa used bait, 24.7% artificial lures and 29.3% artificial flies. When asked to rate fishing on the Lochsa 23.4% rated it "good", 40.8% "fair", and 35.8% "poor". Over 51% of the anglers interviewed preferred to catch a few large fish, while 48.8% would rather catch many small fish. Over 53% of the anglers were in favor of a restrictive regulation to restore cutthroat to the Lochsa, and 56% favored an 8-inch minimum size limit for trout in the Lochsa.

We snorkeled the established transects in the Lochsa River and Crooked Fork, Papoose and Squaw Creeks on 10 and 25 August 1976. We noted a decrease in numbers of juvenile steelhead in the Lochsa and an increase in young-of-the-year (YOY) steelhead in the tributaries compared to 1975. No cutthroat were seen in Lochsa River transects in 1976 but increased numbers were noted in Papoose Creek.

#### Job 5. South Fork Boise River Fisheries Investigations

Anglers fished an estimated 14,958 hours to catch an estimated 17,514 fish from the South Fork of the Boise River between 29 May and 30 November 1976. The catch was composed of 1,325 wild rainbow trout, 226 hatchery rainbow trout, 9,525 rainbow trout caught and released, 6,214 mountain whitefish, 112 Dolly Varden trout and 112 other fish. Caught-and-released rainbow trout made up 85% of the estimated rainbow catch and caught-and-released mountain whitefish 79% of the total estimated whitefish catch. Two species, mountain whitefish and rainbow trout, comprised 99% of the total catch.

The river section from Anderson Ranch Dam to Indian Rock accounted for 56% of the angling effort and 53% of the estimated total catch while the section from Indian Rock to Danskin Bridge sustained 46% of the effort and yielded 47% of the estimated catch.

Rainbow trout were caught at an average catch rate of 0.74 fish per hour while mountain whitefish were caught at a rate of 0.41 fish per hour during the census period.

The mean length of harvested wild rainbow trout was 343 mm (13.5 in) and mountain whitefish was 337 mm (13.2 in).

Back calculation of wild rainbow trout lengths from a linear regression analysis of scale samples showed wild trout length at 124 mm (4.9 in) at annulus one, 201 mm (7.9 in) at annulus two, 267 mm (10.5 in) at annulus three, 333 mm (13.1 in) at annulus four and 380 mm (14.9 in) at annulus five. The sampled rainbow reached minimum legal harvestable length (305 mm or 12 in) during the fourth year of life.

License checks during creel census interviews indicated that local anglers comprise the bulk of South Fork anglers with 86% of the anglers having resident combination (Class 01) or resident fishing (Class 03) licenses and with 84% claiming residence in either Boise or Mountain Home. Anglers interviewed expressed support (82% in favor) for "management for a self-sustaining wild rainbow trout fishery with restrictive special fishing regulations."

#### Job 6. Wolf Lodge Creek Cutthroat Trout Studies

No report has yet been received from the University of Idaho Cooperative Fishery Research Unit who conducted the project.

#### Job 7. Henrys Fork Fisheries Investigations

We used a combination of random ground and aerial counts to estimate total angler effort, harvest and species composition from angler interviews on 111 km (69 mi) of the Henrys Fork of the Snake River (1 January to 31 August 1976). Our interviews covered an estimated 3.4% of the total angler hours.

From 1 January to 31 August 1976, anglers fished an estimated 169,980 hours to harvest 88,054 trout or 94,664 game fish. The winter and spring fishery on the lower three stream sections accounted for 10% of the total effort and 7% of the total catch. Section 13 (above Macks Inn) had the highest angler effort and the greatest harvest. The counts and interviews for the entire river indicated that 62% of the angler effort was by residents, 30% of all anglers fished with the aid of a boat, 51% fished with bait, 10% with lures and 39% with artificial flies.

The composition of the fish harvested on the Henrys Fork was 53% wild rainbow, 19% hatchery rainbow, 16% brook trout, 5% hybrids, less than 1% cutthroat, less than 0.1% kokanee and 7% whitefish. Harvested wild rainbow averaged 256 mm (10.1 in) in total length, hatchery rainbow 230 mm (9.1 in), brook trout 212 mm (8.3 in) and whitefish 321 mm (12.6 in).

By 31 August an estimated 16% of all hatchery catchables planted in 1976 were returned to the creel. Sections 12 and 13 showed the highest returns with 31%. Hatchery rainbow released as fingerlings in the fall of 1975 began to enter the catch mainly in August. By 31 August, only 0.8% of them had been returned to the creel. Their mean total length was 234 mm (9.2 in).

Comparisons of similar time periods in 1973 and 1976 indicated an increase in total angler hours of 4%, a decrease in trout harvest of 11%, and

no change in the mean total length of wild rainbow harvested. An increasing amount of catch-and-release fishing may account for part of the decrease in harvest.

#### F-67-C-2 -- FISHERY RESEARCH SUPERVISION

The Fishery Research Supervisor spent the quarter supervising the eight Dingell-Johnson projects with their 29 separate jobs.

The Fishery Management Supervisor spent the quarter coordinating the fishery management investigations project with its many jobs.

#### F-68-R-1 -- TEST REARING OF SPRING CHINOOK SALMON

##### Job 1. Evaluation of Release Time of Pond Reared Chinook Salmon

We released 264,000 spring chinook salmon smelts 4-6 October 1975 and 6,000 right maxillary clipped smelts 10-14 April 1976 into Hayden Creek to study the effects of release time on small survival and adult returns. Evaluation of the results will take place as the adults return in 1977-79.

The quality of the smolts was higher among the fall released fish. The spring released fish were exposed to bacterial kidney disease (KD) that caused high mortality.

A total of 108 adults returned to the research station. Spawning ground surveys indicated an additional 64 adults bypassed the station's adult trap. We calculated a smolt to adult return percentage of .090 for the 1972 release and .115 for the 1973 release.

Bacterial kidney disease caused the loss of one-half the fish held for the spring release. We attempted to control the infection with Erythromycin thiocynate added to the feed. We started a program of injecting adults with Erythromycin phosphate as they enter the holding pens to prevent KD from being passed to their offspring with the sex products.

#### F-69-R-2 -- STREAM FLOW INVESTIGATION

##### Job 1. Evaluation of Applicability of Water Surface Profile Predictive Modeling in Reference to Stream Resource Maintenance Flow Determinations

Spawning width and wetted perimeter curves were constructed from both actual measured field data and WSP predicted data over a range of flows. With the exception of velocity predictions for one cross section, the curve comparisons appear to add reliability to the WSP predictive capability. However, due to the limited amount of data available, investigations should continue to define limitations with the WSP program.

##### Job 2. Stream Resource Maintenance Flow Determination on Idaho Streams

Stream resource maintenance flows are recommended for 13 streams

studied during 1976. The flows were determined by measurement of flow parameters at one discharge at each study site for utilization with the Bureau of Reclamation's water surface profile computer program to predict flow parameters (velocities and depths) over a range of flow stages, and then correlating the predicted values with biological criteria for fish and wildlife in the streams.

Study streams included: Wolf Lodge Creek, Lemhi River, South Fork Payette River, South Fork Boise River, Big Wood River, Malad River, Willow Creek, Box Canyon Springs, Lower White Springs, Sand Springs, Briggs Springs, St. Charles Creek and the Snake River (Brownlee flow line upstream to American Falls Dam).

## F-77-R-1 -- REGIONAL FISHERY MANAGEMENT INVESTIGATIONS

### Job 1-a. Region I Mountain Lakes Investigations

We introduced 20,000 Mysis relicta to a deep (35 m) mountain lake (lower Stevens Lake) in an attempt to provide a supplemental food organism and enhance the growth of a stunted brook trout population.

We visited Lake Darling, which contains a stunted brook trout population to assess its potential for supporting a self-sustaining rainbow or cutthroat population and/or serving as a brood stock lake for westslope cutthroat trout.

The lake has sufficient tributary spawning area to support a population of stream spawning species, but insufficient size to provide significant egg production as a brood stock lake.

### Job 1-b. Region I Lowland Lakes Investigations

After presenting management alternatives for Hayden Lake for public scrutiny and comment, we selected the option of enhancing cutthroat populations through restrictive regulations and supplemental stocking of westslope cutthroat.

Coeur d'Alene Lake provided the best kokanee fishing in years. Success rates for handliners during the spring exceeded those reported in 1967 when one-fourth million kokanee were harvested.

We cooperated with the Idaho Cooperative Fishery Unit in relocating Coeur d'Alene Lake cutthroat spawners above culvert blocks. We also helped scale sample and jaw tag 130 cutthroat spawners.

Anglers experienced poor kokanee angling at Priest Lake in 1976. Trophy lake trout fishing was better than has been experienced in some time. After several years of tributary observations in the upper Priest drainage, we have concluded that reduction of mortalities due to angling and Dolly Varden populations would be necessary to provide better cutthroat fishing via enhanced survival of juvenile fish in upper Priest River and in the lake.

We collected 913,000 kokanee eggs in Sullivan Springs, tributary to Pend Oreille Lake. We plan to hold these fish at Clark Fork and Sandpoint hatcheries until mid-July when cladoceran populations are more conducive to young-of-the-year survival.

We collected 125,000 Kamloops eggs from wild fish collected via hook and line from the Clark Fork River. We released 60,000 fry in Spring Creek in late August and are holding additional fish for brood stock and release as yearlings.

#### Job 1-c. Region I Stream Investigations

Snorkeling on the Coeur d'Alene River above Enaville and the North Fork indicates a positive response of cutthroat populations to restrictive regulations imposed in 1975.

Electrofishing samples collected in the South Fork of the Coeur d'Alene indicate those areas below Osburn are devoid of fish due to heavy metals toxicity. Reaches of the South Fork above major mine effluent inflow support good trout populations.

Snorkeling on the upper St. Joe indicates good numbers of cutthroat (9-62 cutthroat per transect) and good numbers of large cutthroat (330 mm+) in the Red Ives area.

During limited sampling by set line and hoop net, we captured four ling (Lota lota) in the Kootenai River near Copeland.

#### Job 1-d. Region I Technical Guidance

Region I management personnel provided private individuals, organizations and state and federal agencies with technical guidance and advice on projects associated with or having impacts on the fishery resource or aquatic habitat in Region I. This guidance included written comments on 168 documents.

#### Job II-a. Region 2 Mountain Lake Investigation

Seven mountain lakes were investigated during summer 1976 in Region 2. Several of the lakes scheduled to be visited, Big Foot, Hidden and Dennis Lakes, were not investigated due to various problems. These lakes we anticipate rescheduling in 1977.

Brushy Fork, Bills and Emerald Lakes, all in the Brushy Fork Creek drainage, had good populations of cutthroat. A barren lake, Pat's Lake, was surveyed and determined capable of supporting fish and is scheduled for planting. Line Lake was surveyed by Forest Service personnel and we will soon be obtaining their information. Steep Lake, North Fork Clearwater River has good population of golden trout. Twenty-five pair of trout were observed spawning in the inlet. Ocular surveys showed good numbers of various age classes. Fish Lake, North Fork Clearwater contains westslope

cutthroat and Dolly Varden. A viable brood stock of westslope cutthroat is being established at the Clark Fork Hatchery with eggs secured from Fish Lake stock. The season opens 1 August to protect the species from overutilization. The catch rate is going down and several enhancement measures are being taken to revitalize the fishery.

#### Job II-b. Region 2 Lowland Lake Investigations

Anglers at Winchester Lake spent 57,870 hours to harvest 34,587 fish during May, June and July, 1976. Rainbow trout was the predominate species harvested with 68% of the trout catch from the fingerling plants.

Boat and shore anglers at Waha Lake spent 11,261 hours to harvest 12,448 rainbow trout during May, June and July, 1976. We estimated anglers harvested 88% of the catchables during the census period. The 1975 fingerling plant made up 20% of the fish harvested.

Anglers at Manns Lake spent 15,198 hours to harvest 11,811 fish during May, June and July, 1976. We estimated that 61% of the catchable trout were harvested during the census period. Largemouth bass made up a minor portion of the harvest.

We estimated anglers at Soldiers Meadow Reservoir spent 14,321 hours to harvest 10,405 fish, of which 7,172 were from the fingerling plants. The census period was during June and July, 1976. Some loss of fingerling occurred after the ice left and was diagnosed as increasing ammonia and viral infection, but the kill was extensive.

Catch rates at Spring Valley Reservoir ranged from .53 to 2.9 fish per hour for the entire fishing season.

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#### Job II-c. Region 2 Stream Investigations

We sampled Deer Creek, tributary to the Salmon River, with electrofishing gear. We found a good number of brook trout in the three sections sampled with a mean size of 105.4 mm (4.1 in).

Streams draining Woodrat Mountain range from Pete King Creek on the upper end to Lolo Creek on the bottom. Base line information is being collected for most streams. Cutthroat trout found in the Lolo Creek tributaries have been collected to determine if they are of the pure strain or not.

Breakfast Creek and Floodwood Creek, tributaries to Dworshak Reservoir, both contain stream blocks that keep the kokanee from utilizing all of the spawning ground. Spawning does occur in both drainages.

We surveyed Orogande Creek, tributary to North Fork Clearwater, to obtain preliminary data on a dredge mining application. Both cutthroat and rainbow trout were found in the section of the stream to be dredged.

#### Job II-d. Region 2 Technical Guidance

Comments or inspections were made on 62 stream alteration permit

applications. A wide range of alterations were applied for as to environmental impact.

Evaluation and comments were made on Forest Service Management Unit plans, Farm Pond Permits, State Clearinghouse SAI Projects, various road relocations and mining operations.

#### Job II-e. Region 2 Salmon and Steelhead Investigations

With the exception of the South Fork Clearwater River, all areas in Region 2 had an increase in the number of spring Chinook redds. Bear have been taking salmon kelts as soon as available, which eliminates spawning information from that source.

All three Chinook incubation channels were utilized during 1976 with a total eyed egg plant of 381,743. Channel tenders have been hired to monitor flows at all channels.

The Clearwater River had a catch-and-release (with restrictive gear) steelhead season during the fall of 1976. It was a successful season with a combined bank and boat success rate of 4.7 hours per fish. The catch-and-keep season on the lower Salmon was also successful with a 10.2 hour per fish catch rate.

#### Job III-a. Region 3 Mountain Lakes Investigations

During the study period, personnel from the U.S. Forest Service and the Idaho Department of Fish and Game inventoried a total of 41 high mountain lakes in Region 3. We found populations of fish in 14 lakes; no fish in 6 lakes that we have planted in the past, 6 lakes that have not received fish but could support them and 15 lakes that do not have the potential to support fish.

#### Job III-b. Region 3 Lowland Lakes and Reservoirs Investigations

Personnel from the United States Bureau of Land Management and the Idaho Department of Fish and Game surveyed Spencer, Triangle, Louisa, Big Blue and Little Blue Reservoirs during the study period. All reservoirs lie in the semi-arid desert of Owyhee County. We found excellent trout populations in Triangle and Louisa Reservoirs and only rough fish in Spencer and Little Blue Reservoirs. We found Big Blue Reservoir dry.

During analysis of past research at Cascade Reservoir, we found a greater catch rate of coho and rainbow trout during 1972 than in any other year. We felt the greater catch rates resulted from a different water release program during the winter and spring of 1971-72.

During the 1976 study period we made an attempt to study coho emigration from the reservoir during the spring spill period but bridge reconstruction over the spillway prevented use of the spillway. We did demonstrate that anglers could achieve greater catch rates in the forebay when water was not passed over the spillway during periods of coho emigration.

### Job III-c. Region 3 Stream Investigations

During the study period, personnel from the United States Bureau of Land Management and the Idaho Department of Fish and Game surveyed 19 streams in Owyhee County. We found some degree of livestock use on all streams sampled with various degrees of stream bank damage.

We electrofished 17 of the 19 streams surveyed and set a small explosive charge in one. We captured rainbow trout in 11 streams. Long-nose dace appeared most frequently in our samples with mountain sucker the next most frequent.

### Job III-d. Region 3 Technical Guidance

During the study period I reviewed and commented on documents received from Idaho Department of Water Resources, Idaho Department of Health and Welfare, Idaho Department of Transportation, United States Environmental Protection Agency, United States Army Corps of Engineers, and Ada Council of Governments. I also cooperated with the State of Idaho Department of Health and Welfare to conduct biological surveys of two streams in Canyon County, Idaho.

### Job III-e. Region 3 Salmon and Steelhead Investigations

Salmon spawning ground surveys were conducted on the South Fork Salmon River drainage and on portions of the Middle Fork Salmon River drainage. Results of these surveys were combined with those of Regions 2 and 6 and are reported in the job performance report for Project F-49-R-15.

### Job IV-a. Region 4 Mountain Lakes Investigations

Morphological information collected from three of the four Ross Fork Lakes in the South Fork, of the Boise River drainage during late August and mid-September showed maximum depths of approximately 19.8 m (65 ft), 16.8 m (55 ft) and 10.1 m (33 ft). Total dissolved solids in two of the lakes was 16.8 mg/l. Bottom water temperatures ranged from 11.1 C (52 F) at 19.8 m (65 ft) on 25 August to 3.3 C (38 F) at 10.1 m (33 ft) on 13 September.

Fish growth and catch rates indicated good stocking densities in Ross Fork #1, 2 and 4 and natural reproduction in Ross Fork #3 appears to be adequate.

### Job IV-b. Region 4 Lowland Lake Investigations

The aeration system at Thorn Creek Reservoir performed well in the winters of 1975 and 1976. Some periodic mechanical problems occurred, but the unit ran nearly continuously during the winter and kept sizeable portions of water open near the dam most of the operating period. No winterkill could be detected in the reservoir after the ice cover left in mid-April and gill net checks showed excellent populations of trout had carried over. This was the first time known that at least a partial winterkill did not occur in the reservoir. The average size of the carry-over rainbow was approximately 340 g



(12 oz) with some fish going to 794 g (28 oz). Fishing was very good during the summer of 1976. The system was placed back into operation on 16 November 1976, and was still functioning well at the end of the year.

Gill net checks on Bray Lake indicated good populations of channel catfish were present. A total of 29 channel catfish were caught in two overnight gill net sets. The fish had an average total length of approximately 330 mm (13.4 in) and were results of a fingerling plant made in September of 1973. No channel catfish were caught in two additional daytime sets made in the reservoir.

#### Job IV-c. Region 4 Stream Investigations

Growth rates of jaw tagged wild and hatchery catchable rainbow trout were assessed in the Richfield Canal from mid-April through early October of 1976. Catchable rainbows grew slightly faster than the wild rainbow, however, the catchable growth rate was only about 20% as great as between 1964 and 1969. The average weight of all trout salvaged from the canal has declined sharply since 1970 but showed an upward trend in 1976.

Two sturgeon caught from the Bliss Dam-King Hill stretch of the Snake River showed outstanding growth in comparison with middle Snake River sturgeon. One 171.5 cm (67.5 in) fish was found to be only 13 years old and one 76.2 cm (30.0 in) fish was only 6 years old.

Excellent populations of brown, cutthroat and rainbow trout were found in electrofishing approximately 244 m ( 800 ft) of Shoshone Creek on the lower end of Shoshone Basin. Rainbows to 381 mm (15.0 in) and browns to 394 mm (15½ in) were collected. Scale readings showed good growth rates for the browns.

Stream flow studies conducted on the Big Wood River between Bellevue and Magic Reservoir indicate a minimum flow of 4.5 cu m/s (159 cfs) should be maintained throughout the year based on rearing flows for fish production.

#### Job IV-d. Region 4 Technical Guidance

A total of 41 stream channel alteration permits or proposed stream alteration projects were processed, reviewed or inspected in Region 4 during 1976. Approximately half of them (20) involved projects in the main stem Big Wood River and about 29% (12) involved projects on streams tributary to the Big Wood River. Thirteen of the projects were approved under Department of Water Resources Minimum Standards.

Eighteen National Pollution Discharge Elimination Standards were reviewed. Fifteen of these involved extension of time limits on or modifications of existing permits.

Environmental comments were furnished on about fifteen miscellaneous projects or plans.

Comments were made regarding three U. S. Forest Service projects and

plans, three Bureau of Land Management studies, plans and projects and two Bureau of Reclamation use plans.

#### Job V-a. Region 5 Mountain Lakes Investigations

Inactive

#### Job V-b. Region 5 Lowland Lakes Investigations

Returns of tagged rainbow trout planted 3 May 1976 at Daniels Reservoir, Deep Creek Reservoir and Devils Creek Reservoir were 14%, 16% and 18%, respectively. Returns of tagged rainbow trout planted 19 July 1976 at Daniels Reservoir, Deep Creek Reservoir and Devils Creek Reservoir were 4%, 8% and 8%, respectively.

We planted two different varieties of cutthroat trout in Blackfoot Reservoir to assess their returns. Returns to date of the Henrys Lake variety, planted in 1973, were 2.8%; returns of the Webster Hatchery variety (fine spotted) planted in 1975 were 2.0%.

Survival of test fish placed in live boxes in the newly acquired Highway Pond was excellent. This pond located approximately 3 mi south of Pocatello will be planted in 1977.

#### Job V-c. Region 5 Stream Investigations

We estimated the populations of spawning cutthroat in Spring Creek, a major spawning area in the upper Blackfoot River drainage, during a 1-week period in 1974 and 1975 at 584 and 614 fish, respectively.

We captured 213 trout by electrofishing a section of the Portneuf River downstream from the city of Lava Hot Springs. Ninety-eight percent of the trout were wild rainbow and 2% were wild cutthroat.

We estimated a spring and summer population of trout in a section of the upper Portneuf at 4,687 and 1,855 fish, respectively. Eighty-four percent of the trout seen in this section were wild rainbow, 3% hatchery rainbow and 13% wild cutthroat.

We tagged 313 adult cutthroat in Spring Creek in 1974 and 1975. Tag numbers from 40 of these fish were returned of which 34 were taken from the upper Blackfoot River and tributaries.

Catch of trout per angler from the upper Blackfoot River and tributaries varied from 1.56 fish in July, 1975 to 3.63 fish in July, 1972. Ninety-six percent of the fish taken in July were wild cutthroat and 4% eastern brook trout.

#### Job V-d. Region 5 Technical Guidance

During 1976 I reviewed and made comments on 18 proposed road construction projects, 39 proposed stream alteration projects, 12 water right applications and 12 National Pollutant Discharge Elimination System permits. I

also reviewed and made numerous comments on proposed land and timber sales, oil and gas exploration leases, lake shoreline alteration projects, irrigation projects and State Water Plan.

I assisted with the collection of fish, sediment, plankton and drift samples which were checked for pesticides as a result of the Teton Dam failure.

I spent considerable time reviewing and commenting on proposed phosphate mining projects in southeastern Idaho.

#### Job VI-a. Region 6 Mountain Lakes Investigations

A creel census of the first ice fishery at Williams Lake yielded estimates of 3,286 angler hours and 4,447 fish harvested. We hauled a trawl in Alturas and Redfish Lakes to evaluate the attempted introductions of Mysis shrimp. No shrimp were collected. We physically surveyed five mountain lakes and cataloged 116 others.

#### Job VI-b. Region 6 Lowland Lakes Investigations

Experimental gillnetting at Island Park Reservoir, Teton Reservoir borrow area and East Springs Impoundment on the Market Lake Wildlife Management Area provided information showing needs for rehabilitating these fisheries by treatment with fish toxicants to eradicate Utah chubs and other nongame species before restocking with game fish.

Lake trout made up a greater contribution to net and sport catches in Palisades Reservoir indicating that prior years' stocking of this species is having some effect and should be resumed. High incidence of parasitism by the nematode parasite, Philonema, in cutthroat trout support the present program of stocking catchable-size cutthroat in early summer so that as great a return as possible to creels may occur during the year of planting.

Owing to apparent lack of survival of the initial plant of walleye fry in Mud Lake, no additional planting of this species in Mud Lake is recommended.

Owing to scarcity of perch or bullheads of catchable size in Rays and Sandhole Lakes, opening of these lakes on Camas National Wildlife Refuge to fishing is not recommended.

Rainbow, cutthroat and brown trout fingerlings planted in newly-impounded Ririe Reservoir grew approximately 178 mm (7 in) during the first year; but, owing to larger size at planting, more varied food habits and less movement out of the reservoir, rainbow made a greater contribution to creels and had a much better condition than the other species.

#### Job VI-c. Region 6 Stream Investigations

We evaluated catch-and-release regulations on cutthroat trout in the Middle Fork Salmon River by fishing with standardized terminal gear, by fish length, and by actual fish counts by divers. Catch rates of cutthroat

are comparable or greater than in 1959-60 and significantly higher than during 1969. The proportion of cutthroat greater than 300 mm total length measured during August was higher than in any previous study. In 1976, we counted 192 cutthroat in diving transects and 52% were judged to be greater than 305 mm (12 in), compared to 185 cutthroat with 13.5% greater than 305 mm (12 in) in 1971.

Mortality of fish in Panther Creek has decreased below Blackbird Creek since 1967 as determined by live box tests. Fish mortality was 100% in Panther Creek below the confluence of Big Deer Creek.

An estimated 5% of anglers using the 26 km (16 mi) of open water of Henrys Fork between St. Anthony and Wendell bridges during the January through May period were interviewed. An estimated 4,967 resident and 544 nonresident anglers fished 19,011 hours for 6,048 rainbow trout, 1,296 hybrid trout, 48 cutthroat and 1,146 whitefish. An additional 6,156 rainbow, 1,168 hybrids and 1,146 whitefish were reported caught and released. The average hourly rate of catch was 0.39 trout or 0.77 if catch-and-release reports are included. Fifty-nine percent of the hours and 83% of the catch occurred in the 4-mi reach (section 2) between Chester Dam and Ora bridge. This reach is becoming nationally recognized, showing increases in percentage of non-resident anglers, float and fly fishing, and fishing-for-fun (catch and release) angling.

A popular new trout fishery has developed in the tailwaters of newly constructed Ririe Dam. Continued productivity will depend upon continuous release of high quality water.

The failure of Teton Dam caused widespread destruction to Teton River, the North and South Forks of the Teton, Henrys Fork, Warm Slough, Texas Slough, Bannock Jim Slough, Snake River, Spring Creek and the lower Dry Bed.

#### Job VI-d. Region 6 Technical Guidance

Technical assistance and services were provided to the State Parks, Land, Water Resources, and Health and Welfare Departments; United States Forest Service, Bureau of Land Management, Energy Research and Development Administration, U.S. Fish and Wildlife Service, Corps of Engineers, Bureau of Reclamation, U.S. Environmental Protection Agency, and private power companies, resorts, water boards and individuals.

#### Job VI-e. Region 6 Salmon and Steelhead Investigations

Salmon spawning ground surveys were conducted in the established trend areas. During the fall steelhead fishery in the Salmon River below North Fork, we determined that 47% of the fish were of hatchery origin. We sampled 10 Salmon River tributaries between Corn Creek and Vinegar Creek. Juvenile steelhead were sampled in seven of the tributaries, but none of the fish showed evidence of hatchery origin. We trapped fish from two irrigation screens on Carmen Creek between 19 May and 18 June to check for chinook salmon. None were collected.